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# Oracle FLEXCUBE for Oracle Engineered Systems

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## Executive Overview

These days, banking and IT transformation go hand-in-hand. While globally, the banking landscape is undergoing rapid transformation, financial institutions, faced with reduced operating margins and growth pressure, are aggressively expanding their current operations. As these institutions advance on their growth trajectory, they are confronted with the daunting task of managing standard application infrastructure that can help them consolidate operations while meeting regional requirements.

This white paper illustrates how Oracle Engineered Systems offer unique business and IT benefits to financial institutions using Oracle FLEXCUBE suite that other competitive platforms simply cannot deliver. Oracle Engineered Systems dramatically increase performance of the Oracle FLEXCUBE solution, which translates into End of Day batch closing in as little as 38 minutes (5 million customers with 15 million accounts) and End-of-Month batch closing in a little over 2.5 hours (20 million customers with 25 million accounts). This enables the financial institutions to swiftly respond to changing regulatory environment while at the same managing the complexity of delivering financial services through multiple channels. Oracle Engineered Systems deliver these benefits while reducing their data center footprint and simplifying application maintenance and achieving a 200% return on investment - thereby improving overall operational efficiency.

## Introduction

Changes in the financial services landscape over the past few years have been far more dramatic in comparison with those in the last fifty years. While evolving technology has played a role, global financial macro environment has in fact been the chief catalyst in this transformation. The economic slowdown has directly affected customer perception of banks being trustworthy and infallible institutions. The new post-crisis customer demonstrates clear expectations focused on a bank's brand integrity, the value for money it offers and the quality of its services.

On the other hand, technology has changed the way we interact everyday, which in turn, has changed the businesses around us. The banking industry too has been a witness to this transformation with the adoption of e-commerce, social media, instant messaging and self-service banking. Today's technology-savvy customer is exposed to an external environment that includes a varied set of experiences in every sphere - making purchases, searching for information, networking with people, and taking important decisions. The use of live chat, video conferencing, mobile applications, and various social networking sites has brought about extraordinary changes in people's lives. Individuals extend this new behavior to various areas and expect a similar experience — as customers interacting with banks, as members of a bank's staff managing their daily work and as IT staff handling a bank's technology requirements.

In order to meet these changes, banks need to understand this shift and adopt a future-proof approach to break the current mold. Efficiency, innovation and above all, customer-centricity are increasingly becoming competitive differentiators as well as factors necessary to reconnect with customers.

## Current Technology Challenges in Banking

Banking industry environment today is characterized by a continuous struggle to deliver a differentiated client experience amidst tumultuous market conditions. Banking executives globally are facing 2 primary business challenges.

- Ensuring compliance with rapidly changing regulatory environment
- Supporting end-user needs for a rich interactive experience across traditional and non-traditional financial services delivery channels (ATMs, PoS, mobile, internet)

TECHNOLOGY CHALLENGES - TIER I BANKS*	TECHNOLOGY CHALLENGES - TIER II BANKS
Multi-country multi-application support	Legacy IT applications
Application redundancies due to M&A	High cost of modern IT systems
Lack of global architectural policy	Availability and scalability of existing applications
Data center management	Security risk and vulnerability
Complexity in disaster recover planning & management	Lack of architecture governance
Performance, scalability and availability of legacy technology-based applications	Lack of optimized utilization of infrastructure capabilities
Complexity involved in moving legacy technology to modern N-Tier SOA-based architecture	Disaster recovery processes
Product integration and process streamlining	Vendor complexity (thereby resulting into less opportunity for customization)
Country-wise regulatory implications	Staff training
Ballooning IT costs	Change management
Vendor complexity (thereby resulting into less opportunity for customization)	
Managing the impaired hardware / systems	
Staff training	
Change management	

## Why Vendor Choice Matters

Upon examining the macro trends in the industry closely, you'll find that there are quite a few trends that can be daunting for your enterprise. IT is becoming more and more integrated with every business aspect, more than most of us realize. Mobile devices are a big part of this. These mobile devices along with increasing regulatory and compliance requirements generate tremendous amount of data. With big data gaining more traction, IT portfolio management needs to be focused on re-engineering business processes and IT infrastructure with the overall goal of providing greater value to the customer. All this increases complexity at business level which can be a nightmare for your enterprise IT staff.

**Figure 1: Bank IT Spending Areas for 2014 – North America**



Source: TBR

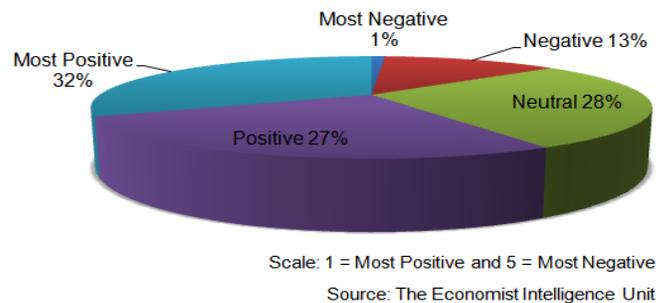
From an investment perspective, banks spend staggering amount of their IT budgets each year to just maintain the status quo (run the bank) as oppose to creating new business models transform the bank). According to a [survey](#) by Technology Business Research Group in August 2013 (refer to Figure 1 above), banks in North America alone are expected to spend US\$21B on infrastructure, business applications, database, middleware, systems management and business intelligence.

Back this up with the overall North America region (US, Canada) IT spending each year - up to US\$61.9B by 2015 according to Celent's current [estimates](#), and you start understanding the magnitude of maintenance and difficulty in maintaining smooth operations at a bank.

Banks that can be agile enough to meet these changes in a cost-effective way are the ones who gain the competitive edge in the marketplace. That said, a majority of the IT procurement happens in a very haphazard way. The presence of multiple vendors with point solutions leads a situation where there is a whole host of legacy systems and inter-dependencies across the ecosystem. Too often, businesses that are tied to complex IT systems cannot adequately support new ideas and changing business models. Time and again, executives cite the existence of disparate legacy systems as a top hindrance to in-house developed innovation. The more complexity you can remove from your IT environment, the more transformational innovation is possible.

According to a [recent paper](#) from the Economist Intelligence Unit (refer to Figure 2 below), 59% of companies value innovation generated from within - so it's important for enterprises to create an environment in which innovation can thrive. Gartner [claims](#) that in reality most IT resources (both dollars and people) are kept aside on maintaining the status quo. Over 60% of enterprise IT budgets is spent as operating expenditure.

**Figure 2: What is your overall perspective on how your company values innovation that is generated from within the business?**



Oracle is the only enterprise in the world which has a complete and integrated stack that simplifies IT. Oracle customers can focus on the innovation they need to compete in a complex marketplace. "Engineered to work together" - Oracle is executing on this strategy by developing a complete portfolio of IT technologies - servers, storage, operating system, virtual machine, database, middleware and full suite of applications that are all engineered to be absolutely best in their respective class.

All Oracle products are built on open standards that can all work independently and in heterogeneous environments. That said, we at Oracle are bringing all these development teams together and actually engineering across the stack.. Oracle tests everything within a stack layer and across stack layers, from applications all the way down to the servers and storage. Oracle then certifies all these different combinations so that customers know which specific versions of software are designed to work together and Oracle manages and supports them all together. But it's more than just certification. Because this is one development organization, we are actually developing these components in sync with each another. If the database team is working on a new patch, it's also going through regression testing with the OS, the virtualization and the servers and the storage teams.

Further, Oracle makes it easier to deploy Oracle FLEXCUBE and Oracle systems together, as the entire stack is designed to be easily upgraded, managed and supported together. As a result, what Oracle customers get is an optimized overall IT stack that provides best-in-class reliability and security. Since the solution is easier to manage, upgrade and support, this results in much lower cost of ownership. Oracle customers need not spend all their resources on managing the core back-office services. We at Oracle see this as our job to innovate on these IT infrastructure elements. If Oracle can help free up this time at the customer-end, that frees up its customers to spend more time innovating on their business - their intellectual property which their customers are buying from you.

This gives Oracle a really unique position in the IT industry.

## The Solution: Oracle FLEXCUBE with Oracle Engineered Systems

Oracle Engineered Systems combine best-of-breed hardware and software components with game-changing technical innovations. Designed, engineered and tested to work best together, Oracle Engineered Systems can power the cloud or streamline data center operations to make traditional deployments even more efficient. The components of Oracle Engineered Systems are pre-assembled for targeted functionality and then - as a complete system - optimized for extreme performance. By taking the guesswork out of these highly-available systems, Oracle delivers a solution that is integrated across every layer of the technology stack; a simplicity that translates into less risk and lower costs for your business. Only Oracle can innovate and optimize at every level of the stack to simplify data center operations, drive down costs, and accelerate business innovation.

### **Oracle Exadata Database Machine:**

Oracle Exadata Database Machine is Oracle's database platform delivering extreme performance for database applications including Online Transaction Processing, Data Warehousing, Reporting, Batch Processing, or mixed database workloads. Exadata is a pre-configured, pre-tuned, and pre-tested integrated system of servers, networking and storage all optimized around the Oracle Database. Because Exadata is an integrated database system, it offers superior price-performance, availability and supportability. Exadata frees users from the need to build, test and maintain systems and allows them to focus on higher value business problems.

Exadata uses a scale-out architecture for database servers and storage. This architecture maintains an optimal storage hierarchy from memory to flash to disk. Smart Scan offloads queries to the Exadata storage cells to dramatically reduce I/O requirements and database processing. Exadata implements Smart Flash Cache as part of the storage hierarchy. Exadata software determines how and when to use the Flash storage for reads and write as well as how best to incorporate Flash into the database as part of a coordinated data caching strategy. A high-bandwidth low-latency InfiniBand network running specialized database networking protocols connects all the components inside an Exadata Database Machine. In addition to a high performance architecture and design, Exadata offers the industry's best data compression to provide a dramatic reduction in storage needs.

Financial institutions can deploy Oracle FLEXCUBE running on Oracle Exadata Database Machine to centralize their IT systems and create a consolidated back office. By doing so, they can gain better insight into their operations and customers, while increasing business agility. In addition, Oracle Exadata Database Machine uses a building block methodology for expansion. This means financial institutions deploying Oracle FLEXCUBE and Oracle Exadata Database Machine can easily respond to the need for enhanced processing capacity to meet a spurt in transaction volumes.

With unmatched processing capability, scalability, availability and reliability, Oracle FLEXCUBE running on Oracle Exadata Database Machine helps financial institutions prepare for the future.

### **Oracle Exalogic:**

Oracle Exalogic is an Engineered System on which enterprises deploy business applications, Oracle Fusion Middleware or third party software products. Exalogic comes pre-built with compute nodes,

memory, flash storage and centralized storage; all connected using InfiniBand in a high redundancy architecture delivering five-nine availability, with fault tolerance and zero-down-time maintenance. Banks can bring down infrastructure costs dramatically by running Oracle FLEXCUBE on Exalogic infrastructure. This helps large and growing retail banks meeting the challenges of handling high volumes, and equips them with solutions to extend their customer reach, improve profitability and increase levels of service.

Oracle has achieved unique optimizations and enhancements in Exalogic firmware, Exalogic software, and in Oracle's middleware and applications. These include on-chip network virtualization based on near zero latency InfiniBand fabric, high-performance Remote Direct Memory Access, workload management in Oracle WebLogic Server and optimizations in Oracle Coherence and Oracle Traffic Director. Exalogic includes support for a highly optimized version of the Oracle VM, which significantly outperforms comparable virtualization solutions and is an ideal consolidation platform for Applications. Templates to simplify installation, deployment and configuration of applications on Exalogic are available.

#### **Oracle SuperCluster:**

Similar to Engineered Systems such as Exadata, Exalogic, Oracle FLEXCUBE can be deployed on Oracle SuperCluster to achieve high availability, performance, scalability and environment consolidations.

Oracle SuperCluster is the world's most efficient multi-purpose engineered system, delivering extreme efficiency, cost savings, and performance for consolidating mission critical applications and rapidly deploying cloud services. Oracle SuperCluster represents a complete, pre-engineered, and pre-tested high-performance enterprise infrastructure solution that is faster and easier to deploy than a collection of individual database and application servers. The system combines innovative Oracle technology - the computing power of Oracle's servers, the performance and scalability of Oracle Solaris, the Sun ZFS Storage Appliance ideal for database backup, the optimized database performance of Oracle Database accelerated by Oracle Exadata Storage Servers, and a high-bandwidth, low-latency InfiniBand network fabric - into a scalable, engineered system that is optimized and tuned for consolidating mission-critical enterprise applications.

Oracle SuperCluster provides both the capacity for growth, as well as the fine-grained server virtualization needed to consolidate multi-country bank branches, disparate surround systems, delivery channels and business processing layers into a single platform, thereby enabling seamless information management across the bank. Deployment speed, application performance, and availability can all be optimized with the multiple layers of enterprise application infrastructure consolidated onto a high-performance, highly-available SuperCluster system. Designed as a pre-configured, pre-tested, and ready-to-deploy, Oracle SuperCluster provides a complete and optimized infrastructure solution for Oracle FLEXCUBE, built around robust compute, networking, storage, virtualization, and management resources. The result is a system that is orders of magnitude easier to manage, and up to five times faster to deploy than alternatives, all while occupying considerably less real estate requiring less power. Furthermore, Oracle SuperCluster system provides full built-in redundancy needed to deliver a highly reliable banking infrastructure without single point of failure. An issue with one

component will not impact other components of the system offering true isolation. Customers can consolidate multiple Oracle FLEXCUBE environments with minimum disruption, without fear of performance degradation, and the ability to achieve required service levels.

### Technical Benefits of Oracle Engineered Systems:

Here are some of the technical benefits delivered by Oracle Engineered Systems:

- Oracle FLEXCUBE application consists of many batch processing programs that create large workloads. These workloads are highly CPU intensive and database intensive. High concurrency of these workloads requires systems with large memory capacity with large Systems Global Area (SGA) and Program Global Area (PGA) capable of processing high speed disk input/output (I/O). Oracle Engineered Systems are architected to deliver these superior technical capabilities to manage such large workloads.
- Oracle Engineered Systems can handle twice as many users per core compared to other servers delivering the scalability required to add more application users during growth and expansion.
- Linear Scaling easily supports very large deployments.
- Resource Manager can help consolidation of database and application environments by controlling CPU usage, managing CPU contention via instance caging, controlling disk I/O usage, and managing contention via IORM's inter-database resource plans. Customers can achieve higher throughputs as more transactions can be processed using single Exadata core compared to other servers.
- Exalogic has been engineered to leverage a technique known as Single-Root I/O Virtualization to eliminate virtualization overhead and deliver maximum performance and scalability. Mission-critical server virtualization offers a whole new level of consolidation where multiple virtual machines are sharing a single physical server in order to maximize the utilization of server hardware, while minimizing associated cost.
- Oracle VM template for Exalogic reduces installation and configuration time and allows rapid deployment of Oracle FLEXCUBE application.
- Oracle FLEXCUBE customers can load balance web and forms servers, configure parallel concurrent processing and configure Oracle RAC and Oracle Data Guard for high availability.
- Oracle Enterprise Manager Cloud Control (EM) helps with Exadata manageability and provides a composite view of all health indicators of a cell or cell group to diagnose and troubleshoot performance problems efficiently.

Oracle FLEXCUBE customers will benefit from using following unique features of Oracle's Engineered Systems:

## Exadata and SuperCluster Unique Features

### Exadata Smart Flash Cache

Exadata Smart Flash Cache uses Flash memory to dramatically reduce the time to read and write database and log records. The intelligence in Smart Flash Cache transparently moves active database blocks from disk to flash in real time, thus ensuring that "hot" data is in Flash memory when the next access occurs. Blocks that should not be in Flash are similarly recognized, maximizing the amount of space in Flash for active data.

Internal bench marks for Oracle FLEXCUBE have shown following results as a result of Smart Flash Cache:

- Average I/O latency reduced by 58% and no special tuning is required to achieve I/O performance improvement.
- Log file sync events improved by 5% and no special tuning is required to achieve log file sync event improvements

### Exadata Smart Scan

Exadata Smart Scan speeds up data-intensive queries by leveraging the processing power of Exadata Storage Servers to scan and filter out results. By moving queries to storage instead of moving the data to the database servers, long-running reports often complete 10 times faster than conventional systems.

### InfiniBand

The use of InfiniBand as the networking fabric within Exadata ensures the lowest latency for messages and the highest bandwidth for data transfers. High-speed transactions as well as data-intensive queries and reports reap the benefits from InfiniBand. Oracle FLEXCUBE benefits resulting from InfiniBand are:

- 30-40% lower CPU utilization and 100% or more throughput compared to Gigabit Ethernet
- 20% improvement in online transactions response times
- Easier scaling of Oracle FLEXCUBE online transactional processing through low latency

### Exadata Scale-Out Storage

Exadata Scale-Out Storage enables the full performance of Exadata to be realized against large and growing databases, without fear of bottlenecks. As the database size grows and storage capacity is added to Exadata, storage performance and networking bandwidth scale in equal proportion. As a result,

- Backups and Clones can be executed at a rate of 20TB/hour
- Faster incremental backups can be performed

### **I/O Resource Manager (IORM)**

IORM allocates I/O bandwidth across different applications and databases, based on a prioritized allocation plan, to ensure that the most important applications get the performance they need when they need it. As a result, customers can consolidate database and application environments without worrying about resource contention and performance degradation.

### **Exalogic and SuperCluster Unique Features**

#### **Exalogic Exabus**

Applications running on Exalogic utilize Exabus, the underlying InfiniBand fabric, which provides low latency and high throughput eliminating I/O bottlenecks in every application layer. Applications components are typically deployed in more than one server and Exabus provides low latency for I/O across nodes on same Exalogic rack. Access to ZFS storage device over Exabus greatly reduces latency for log file writes and other file access operations. For applications running on Exalogic and accessing the database tier on Exadata, Exabus delivers faster I/O, reduces CPU usage on both the mid-tier and DBtier and providing higher connection pooling efficiency.

#### **Oracle VM**

Exalogic Oracle VM can subdivide a physical compute node into multiple virtual machines to increase application deployment efficiency while maintaining application performance. Oracle VM has been engineered for tight integration with Exalogic Exabus I/O backplane using a technique called Single Root I/O Virtualization (SRIOV) ensuring Oracle VM significantly outperforms comparable alternative hypervisors and other virtualization options. The benefit of this approach is unmatched application performance. In an Exalogic or SuperCluster configuration, the impact of virtualization on application throughput and latency is negligible.

### **Benchmarks - Oracle FLEXCUBE with Oracle Engineered Systems**

1. Product: Oracle FLEXCUBE Private Banking Release 12.0.1.0.0

Platform: Oracle Exadata X2-2 and Oracle Exalogic X2-2

Customers & Accounts: 5 million customers with each having 3 savings and current accounts - total 15 million accounts

Benchmark details recorded

- 176 Relationship Manager (RM) online business Transactions per second (TPS)
- 198 Customer View online business TPS
- 482 combined (RM and customer) online business TPS
- 38 minutes End of Day (EoD) batch elapsed time
- Hardware setup for Online and Batch test runs

DESCRIPTION	HARDWARE	QUANTITY	OPERATING SYSTEM	SOFTWARE
Database Server	Oracle Exadata Database Machine X2- 2 One Compute Node of Quarter Rack Intel(R) Xeon(R) CPU 2.93 GHz	1	Oracle Linux	Oracle 11g R2 11.2.0.3 Enterprise Edition (64- bit)
Application Server	Oracle Exalogic X2-2 One Compute Node of Quarter Rack Intel(R) Xeon(R) CPU 2.93 GHz	1	Oracle Linux	Oracle WebLogic 11g Enterprise Edition
JMeter Controller & Load Generators	4 x 3.0 GHz Xeon Quad Cores, 8 GB RAM	1	Windows 2008 Enterprise Server (64 bit)	JMeter

## 2. Product: Oracle FLEXCUBE Universal Banking Release 12.0.1

Platform: Oracle T5-2 Servers

Benchmark details recorded

Customers & Accounts: 20 million customers with 25 million accounts including savings account, current account and TD account

- 2,152 TPS
- 98th percentile response time 195 ms
- 41 mins 2 secs of Node1 and 40mins 7 secs of Node 2 for End of Day (EoD) batch elapsed time
- 2 hrs 33 mins 2 secs of Node1 and 2 hrs 27 mins 43 secs of Node2 for End of Month (EoM) batch elapsed time
- Hardware setup for Online and Batch test runs

DESCRIPTION	PRODUCT LINE	NUMBER OF PROCESSORS (CORES)	PHYSICAL MEMORY	OPERATING SYSTEM	SOFTWARE
Database Server 1	T5-2 Server	2 (32)	512 GB	Oracle SOLARIS 11 64 bit	Oracle 11g R2 (11.2.0.3.0)
Database Server 2	T5-2 Server	2 (32)	256 GB	Oracle SOLARIS 11 64 bit	Oracle 11g R2 (11.2.0.3.0)
Application Server 1	T5-1B Server	1 (16)	256 GB	Oracle SOLARIS 11 64 bit	Oracle WebLogic 10.3.6
Application Server 2	T5-1B Server	1 (16)	256 GB	Oracle SOLARIS 11	Oracle WebLogic

				64 bit	10.3.6
HP Loadrunner Server & Generator 1	Oracle Sun Fire X4600	16	64 GB	Windows 2003 Server 64 bit	HP Loadrunner 9.5 64 bit
HP Load Generator 2	Oracle Sun Fire X4600	16	64 GB	Windows 2003 Server 64 bit	HP Loadrunner 9.5 64 bit

## Benefits Summary

The following table summarizes some of the technical benefits of deploying Oracle FLEXCUBE on Oracle Engineered Systems, and how they translate to business benefits.

IT BENEFITS	BUSINESS BENEFITS
<p><b>High Availability</b></p> <ul style="list-style-type: none"> <li>Oracle Engineered Systems are architected with built-in redundancy to minimize downtimes</li> </ul>	<ul style="list-style-type: none"> <li>Maximum productivity from uninterrupted mission critical business processes</li> <li>Reduced business disruption</li> <li>Reduced risk of failures</li> <li>Increased regulatory compliance</li> </ul>
<p><b>High Performance</b></p> <ul style="list-style-type: none"> <li>Complying with service level agreements</li> <li>Reduced total cost of ownership due to reduced need for developers or third party consultants required for tuning custom applications</li> </ul>	<ul style="list-style-type: none"> <li>Better, more timely decisions and insight based on real-time access to real-time data</li> <li>Increased competitiveness with faster business problem solution and new opportunities development</li> <li>New end-user and employee applications deployment that were not possible before,</li> <li>Improved and employee productivity</li> <li>Improved business processes and employee productivity by dramatically improving end user responsiveness</li> <li>Ability to offer more products, process more transactions, react to changes quickly by reducing or eliminating the batch processing times for critical applications</li> <li>Increased revenue opportunities by cross-selling to the right set of customers (CRM capabilities) Customer retention by increased customer satisfaction by delivering on-time services</li> <li>Reduced total cost of ownership arising out of maintaining disparate legacy applications</li> </ul>
<p><b>Scalability</b> Oracle's Engineered Systems can scale to increase in users and transaction volumes</p> <ul style="list-style-type: none"> <li>Instance consolidation</li> </ul>	<ul style="list-style-type: none"> <li>Global expansions</li> <li>Efficient, rapid, low cost assimilation during Mergers and Acquisitions</li> </ul>

- Increased business units, users or transactions without worrying about performance degradation

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**Standardization**

- Simplified deployments
- Reduced total cost of ownership
- Seamless support and issue resolution

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**Customer References - Banca Transylvania (Romania):**

**Bank Profile:**

- Bank incorporated in 1994
- Universal bank with operations in retail, corporate and SME sectors
- Ranked #3 in Romania on the basis of asset size
- Ranked #4 in Romania on the basis of network size

**Portfolio of Offerings:**

- Banking
- Leasing
- Factoring
- Consumer Financing
- Asset Management

**Key Financials:**

- Asset Size: US\$5 Billion
- Branch network: 560
- Employees: 6,000

**Challenges faced by Banca Transylvania:**

- Existing systems of the bank were unable to scale to meet the growing customer demands
- High performance and availability issues needed to be addressed
- Operational and maintenance cost of IT systems was very high
- Existing system was inflexible to integrate with 3rd party applications
- Time-to-market for new products took a long time

**Solution provided:**

- Oracle FLEXCUBE Universal Banking was implemented on Oracle Exadata in a matter of 20 months to address the bank's scalability and high performance requirements
- Multi-currency support for all products was offered as part of the solution
- Easy integration with surround systems and market feeds
- 24x7 availability with zero downtime

**Results achieved after implementation:**

- Legacy systems replaced with a new feature-rich integrated platform
- Reduced unplanned downtime
- Up to 2x increase in system performance
- ATM PoS transaction response times
  - 90% < 1sec
  - all others <2 sec
- 200% RoI savings achieved
- Consolidation of applications
- Reduced cost of training bank personnel by simplifying and reducing administrative work
- Data warehousing on a single machine significantly reduced Banca Transylvania's response time for generating complex daily banking reports
- Oracle systems and Oracle FLEXCUBE helped Banca Transylvania launch many new products and services within a shorter time-to-market window

## Conclusion

Oracle FLEXCUBE has become the backbone of hundreds of financial institutions across the globe. Along with the high availability and high performance levels associated with Oracle FLEXCUBE to perform their day-to-day operations, financial institutions expect instant business insights to make informed decisions through improved end user response times, batch processing times and transaction scalability. Oracle Engineered Systems such as Exadata, Exalogic, Exalytics, SuperCluster and Oracle Database Appliance perfectly compliment Oracle FLEXCUBE to meet these needs by delivering accelerated application performance to create new opportunities and business capabilities while reducing total cost of application ownership.

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- \*Bank Tiers follow Gartner's banking tiers methodology
  - Tier 1 includes between 20 and 25 global bank assets and/or capital markets price makers with daily trading volume exceeding 50,000 transactions.
  - Tier 2 constitutes about 200 international and national banks and/or capital markets price takers, as well as trading volume averaging about 30,000 transactions daily.
  - Tier 3 consists of approximately 1,000 banks, including smaller national and regional banks, and capital markets price takers.
  - Tier 4 comprises smaller regional institutions with a primary focus on core banking and limited capital markets trading.



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Author: Abhishek Shah

Oracle Corporation  
World Headquarters  
500 Oracle Parkway  
Redwood Shores, CA 94065  
U.S.A.

Worldwide Inquiries:  
Phone: +1.650.506.7000  
Fax: +1.650.506.7200

[www.oracle.com](http://www.oracle.com)



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**Hardware and Software, Engineered to Work Together**